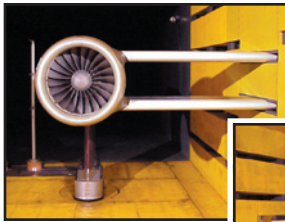


Ingenuity paid off when NASA Glenn engineers found a way to measure turbofan rotor and stator noise separately in 9-by 15-Foot Low Speed Wind Tunnel tests. Isolating rotor noise sources helps to find more effective ways to reduce aircraft engine noise.



Rotor alone



Rotor and stator

NASA Glenn Research Center

Sound sources, directivity, and transmission loss can be measured in the NASA Langley Structural Acoustic Loads and Transmission facility, which consists of an anechoic chamber, a reverberation chamber, and a transmission loss window.



NASA Langley Research Center

You haven't heard our best work!

At NASA we're working hard to keep the noise down. For over 60 years, NASA engineers have been motivated to do their best because they've known that reducing noise pollution is not only good for business—it's good for people and the environment, too.

Noise isn't just a nuisance. While most people will recognize that exposure to high noise levels—whether at work or at play—can result in permanent hearing damage, the impact that noise pollution has on local, national, and international economics is often less obvious. Airport noise, in particular, is a complicated problem requiring true cooperation between citizens, governments, agencies, industry, and academia to make a real difference.

Experts at the NASA Glenn Research Center in Cleveland, Ohio, and the NASA Langley Research Center in Hampton, Virginia, excel at maturing new concepts for noise reduction to a point where industry can take over the development cost effectively. Through innovative collaboration, NASA is working to shrink the time it takes to get proven technologies out of our labs and into everyday use so that we all can share more peace, quiet, and prosperity.

On the cover: Flight test of a chevron nozzle on the NASA Lear 25.

At your service!

Getting help from a recognized world leader in acoustical research has never been easier.

We accept proposals for new collaborative work year-round. You can have NASA experts focus on your organization's specific technical problems by formalizing work through a NASA Space Act Agreement.

To schedule an appointment to tour our facilities, meet our staff, and find out how NASA technology can work for you, please contact:

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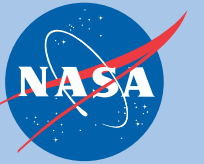
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Products and Services

Testing

What's making all that noise? Did your latest design changes make an improvement? Turn to NASA to find out. We can run just about any aeroacoustic test you can imagine. If off-the-shelf instrumentation isn't enough to do the job right, we can use phased-array and rotating microphones to identify noise sources, and particle image velocimetry to dissect the flow field. We even have mobile measurement equipment that we can bring to you in the field.

Analysis

Don't guess. NASA has developed and validated software to calculate sound produced by a variety of applications. Whether you choose to do the calculations yourself or turn your acoustical problems over to our experts who can run them on one of several computing clusters in the Computational Aeroacoustics Lab, we'll make sure you get the analysis you need.

Workshops and Consortia

Join the team! Experts nationwide are drawn together through workshops and consortia moderated by NASA. Let NASA pull together the brainpower needed to give extra attention to the acoustical problems in your field.

Design Guidelines

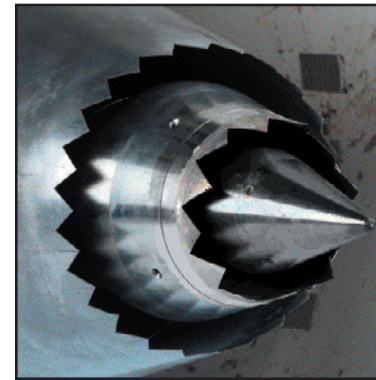
Don't be forced to choose between performance and quiet operation—include low-noise design practices early in your product development cycle. You supply the application—we supply recommendations. Be confident knowing that our guidelines will be based on the results of years of fundamental acoustical research.

At NASA Glenn, turbofan engines are at the center of our attention. We've provided breakthrough technology to quiet fans, jets, and propellers which have been the dominant sources of aircraft engine noise. We're after ways to make these components run more quietly without sacrificing system performance or efficiency.

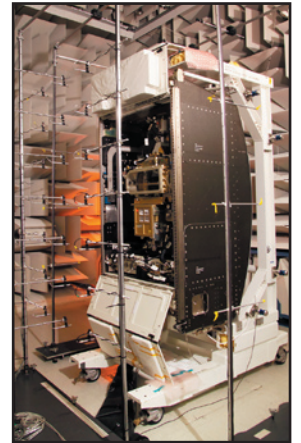
NASA Glenn researchers were the first to prove the benefits of swept stators for turbofan engines which can reduce fan noise by as much as 2EPNdB. Swept stators have been incorporated into the CFM International's CFM-56 and Pratt & Whitney's PW6000 turbofan engine.



NASA Glenn was the first to demonstrate more than 3EPNdB reduction in jet noise using chevron nozzles. Chevron nozzles are already in flight, installed on General Electric's latest generation of CF-34 turbofan engines which power the Embraer 170, Embraer 190, and the Bombardier CRJ900 airliners.



Astronauts using the Fluids and Combustion Facility on the International Space Station will work in a safer, more productive environment thanks to the work done in NASA Glenn's Acoustical Testing Laboratory.

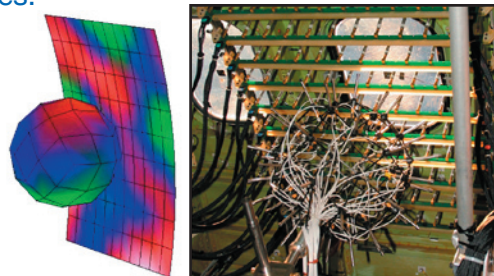


Collaboration with engineers at NASA ensures that noise reduction technologies developed for space exploration are used to improve the lives of people here on Earth, too.

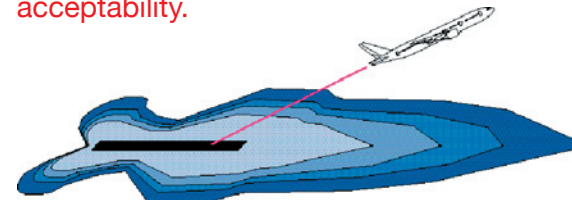
Unique field measurements using microphones suspended 200 feet above ground level have enabled NASA Langley researchers to characterize in-flight noise sources.



At NASA Langley we're developing near field acoustic holography for visualization of complex acoustic fields inside aerospace structures.



At NASA Langley, understanding noise and its impact on aerospace structures and people is what we do best. Using advanced experimental and analytical methods, we're targeting propulsion and airframe integration noise, airframe noise, total aircraft system noise, atmospheric propagation, community noise impact, low-noise flight operations, interior noise, and sonic boom acceptability.



NASA Langley researchers have found ways to modify flight operations and reduce total aircraft system noise, which has improved the lives of people living near airports nationwide.

NASA Langley inventors have produced new microphone array processing algorithms that can identify noise sources more accurately. Pinpointing noise sources allows engineers to apply noise reduction devices where they are most needed. Better tools enable engineers to find better solutions to tough noise problems.

